Attorney Docket No. 24717-718

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	)	Group Art Unit: Not yet assigned
	)	
Mansour J. Karam et. al.	)	Examiner: Not yet assigned
	)	
Application No.: Not yet assigned	)	
	)	
Filed: Herewith	)	
	)	
Title: Method And Apparatus For Characterizing The Quality of a Network Path	)	

PRELIMINARY AMENDMENT

Box Patent Application
Assistant Commissioner for Patents
Washington, DC 20231

Sir:

Prior to examination on the merits, please amend the application as indicated below. Reconsideration is respectfully requested in view of the below amendments and remarks. Please amend the above-identified application as follows:

IN THE SPECIFICATION

Please amend the Specification as follows:

Please insert at page 1, line 3, after the Title:

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CROSS REFERENCE TO RELATED APPLICATION

This application is the National Stage of PCT Application No. PCT/US01/32476, filed October 17, 2001; and is a continuation-in-part of PCT Application No. PCT/US01/32312, filed October 17, 2001; PCT Application No. PCT/US01/31259, filed October 5, 2001; PCT Application No. PCT/US01/31420, filed October 4, 2001; and PCT Application No. PCT/US01/31419, filed October 4, 2001; which are continuations-in-part of U.S. Application No. 09/960,623, filed September 20, 2001; U.S. Application No. 09/903,423, filed July 10, 2001; U.S. Application No. 09/923,924, filed August 6, 2001; and U.S. Application No. 09/903,441, filed July 10, 2001; which claim the benefit of U.S. Provisional Application No. 60/275,206, filed March 12, 2001; and U.S. Provisional Application No. 60/241,450, filed October 17, 2000.

These applications are hereby incorporated by reference--.

Please replace the paragraph beginning at page 17, line 19, to page 18, line 3, with the following rewritten paragraph:

--Therefore, for such embodiments, the corresponding value of δ_d is 37/6.5 = 5.7. That is, when these assumptions hold, the value of δ is significantly higher than for short TCP connections (3.6), but still lower than for voice traffic (10 minimum, 15 on average). In fact, in one embodiment with TCP traffic, the relative importance of delay as compared to loss decreases as the file transferred increases. In one embodiment with typical file transfers, 1% loss rate is equivalent to a 57 ms delay, which is in between the 36 ms delay obtained in one embodiment with short TCP connections and the 150 ms delay obtained in one embodiment with voice traffic. Conversely, a 100 ms delay in one embodiment with typical TCP connections represents a 1.75% loss rate, in between the low 0.6% loss rate obtained in one embodiment with voice and the large 2.78% loss rate obtained in one embodiment with short TCP connections. In order to understand the effectiveness of these approximations in such embodiments when both packet loss and delay come into play concurrently, we show in Figure 9 the approximations for a range of loss rates and one-way delays. As for short TCP connections, our approximation does surprisingly well in most of the ranges of interest for delay and loss rate, respectively.--

Please replace the paragraph at page 25, line 5, with the following rewritten paragraph:

--This equation states that the average time needed to complete the protocol handshake is one round trip time, to which a timeout is added to each lost packet in the transaction. Note that at this stage, the timeout is typically as large as 3 seconds for some embodiments, so even a small loss probability can be significant.—

Please replace the paragraph at page 29, line 7, with the following rewritten paragraph:

-- On the other hand, it has been shown that in some embodiments, opening a multitude of TCP connections simultaneously increases the greediness and aggressiveness of the web browser's behavior, H. F. Nielsen, J. Gettys, A. Baird-Smith, E. Prud'ommeaux, H.W. Lie, and C. Lilley, *Network Performance Effects of HTTP/1.1, CSS1, and PNG,* SIGCOMM' 97, H. Balakrishnan, V. Padmanabhan, S. Seshan, M. Steem, and R. Katz, *TCP Behavior of a Busy Internet Server: Analysis and Improvements,* IEEE Infocom 1998, S. Floyd and K. Fall, *Promoting the Use of End-to-End Congestion Control in the Internet*, IEEE/ACM Transactions

on Networking, 7(6), August 1999. To understand this, we provide the following simple example (from S. Floyd and K. Fall, *Promoting the Use of End-to-End Congestion Control in the Internet*, IEEE/ACM Transactions on Networking, 7(6), August 1999). Say a data transfer is divided among *N* parallel, concurrent TCP transactions. Assume a packet is lost in one of the connections. If all the data were to be transferred using one single TCP connection, the lost packet would lead to the halving of the window size, i.e. to the halving of the connection throughput. Instead, when *N* concurrent TCP connections are used, the lost packet will only halve the window size of one of the *N* connections, leading to a reduction of the aggregate throughput by a mere 1/2*N*! That is, the congestion algorithm that TCP is intended to perform is skewed towards a much larger greediness and aggressiveness, leading to an increase in congestion that can in turn bear a significant degradation in the performance of all streams involved.--

Please replace the paragraph at page 37, line 22, with the following rewritten paragraph:

- --wherein the second metric is at least partly the function of the same plurality of elementary network parameters of the second segment, wherein the one or more segment end points include one or more end-points of the second segment--

REMARKS

In light of the amendments set forth above, Applicants earnestly believe that they are entitled to a letters patent, and respectfully solicit the Examiner to expedite prosecution of this patent application to issuance. Should the Examiner have any questions, the Examiner is encouraged to telephone the undersigned.

Attached hereto is a marked-up version of the changes made to the specification by the current Preliminary Amendment. The attached page captioned "**Version with markings to show changes made.**"

Respectfully submitted,

Date: February 27, 2002 By: Kenta Suzue

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Specification:

Paragraph beginning at line 19 of page 17, line 19 has been amended as follows:

Therefore, for such embodiments, the corresponding value of δ_d is 37/6.5 = 5.7. That is, when these assumptions hold, the value of δ is significantly higher than for short TCP connections (3.6), but still [lower] lower than for voice traffic (10 minimum, 15 on average). In fact, in one embodiment with TCP traffic, the relative importance of delay as compared to loss decreases as the file transferred increases. In one embodiment with typical file transfers, 1% loss rate is equivalent to a 57 ms delay, which is in between the 36 ms delay obtained in one embodiment with short TCP connections and the 150 ms delay obtained in one embodiment with voice traffic. Conversely, a 100 ms delay in one embodiment with typical TCP connections represents a 1.75% loss rate, in between the low 0.6% loss rate obtained in one embodiment with voice and the large 2.78% loss rate obtained in one embodiment with short TCP connections. In order to understand the effectiveness of these approximations in such embodiments when both packet loss and delay come into play concurrently, we show in Figure 9 the approximations for a range of loss rates and one-way delays. As for short TCP connections, our approximation does surprisingly well in most of the ranges of interest for delay and loss rate, respectively.

Paragraph beginning at line 5 of page 25 has been amended as follows:

--This equation states that the average time needed to complete the protocol handshake is one round trip time, to which a timeout is added to each lost packet in the transaction. Note that at this stage, the timeout is typically as large as 3 seconds for some [embodiements,] embodiments, so even a small loss probability can be significant.--

Paragraph beginning at line 7 of page 29, line 7, has been amended as follows:

On the other hand, it has been shown that in some embodiments, opening a multitude of TCP connections simultaneously increases the greediness and aggressiveness of the web browser's behavior, H. F. Nielsen, J. Gettys, A. Baird-Smith, E. Prud'ommeaux, H.W. Lie, and C. Lilley, *Network Performance Effects of HTTP/1.1, CSS1, and PNG,* SIGCOMM' 97, H. Balakrishnan, V. Padmanabhan, S. Seshan, M. Steem, and R. Katz, *TCP Behavior of a Busy Internet Server: Analysis and [Improvments] Improvements,* IEEE Infocom 1998, S. Floyd and K. Fall, *Promoting the Use of End-to-End Congestion Control in the Internet*, IEEE/ACM Transactions on Networking, 7(6), August 1999. To understand this, we provide the following simple example (from S. Floyd and K. Fall, *Promoting the Use of End-to-End Congestion Control in the Internet*, IEEE/ACM Transactions on Networking, 7(6), August 1999). Say a data transfer is divided among N parallel, concurrent TCP transactions. Assume a packet is lost in one of the connections. If all the data were to be transferred using one single TCP connection, the lost packet would lead to the halving of the window size, i.e. to the halving of the connection throughput. Instead, when N concurrent TCP connections are used, the lost packet will only halve the window size of one of the N connections, leading to a reduction of the aggregate throughput by a mere $1/2N$! That is, the congestion algorithm that TCP is intended to perform is skewed towards a much larger greediness and aggressiveness, leading to an increase in congestion that can in turn bear a significant degradation in the performance of all streams involved.

Paragraph beginning at line 22 of page 37, line 22, has been amended as follows:

- --wherein the second metric is at least partly the function of the same [pluralit] plurality of elementary network parameters of the second segment, wherein the one or more segment end points include one or more end-points of the second segment--